

CLAIMS

1. A fuel cell system comprising:

- a fuel cell;

- a load value detecting means configured to detect a load value of a load of electric power or heat which is generated by equipment supplied with the electric power or the heat from said fuel cell system;

- a load value storage means configured to store a history of the load value detected by said load value detecting means; and

- a load value predicting means configured to predict a load value which is going to be generated based on the history of the load value and to store the predicted load value as load value data,

- wherein scheduled start-up time of said fuel cell is decided based on the load value data.

2. The fuel cell system according to claim 1, wherein the load value is a power value of a power load of the equipment supplied with the electric power from said fuel cell system, and the load value data is power value data.

3. The fuel cell system according to claim 2, further comprising:

- a calculating means configured to calculate an amount of primary energy consumed to supply the electric power, an amount of carbon dioxide generated by supplying the electric power, or a cost necessary to supply the electric power;

- wherein said calculating means calculates the amount of primary energy, the amount of carbon dioxide, or the cost, based on the power value data for a

predetermined time period, for a case where said fuel cell supplies the electric power and for a case where said power system supplies the electric power, and

values calculated by said calculating means are compared and start time of the time period is decided as the scheduled start-up time when the value calculated for the case where said power system supplies the electric power is larger than the value calculated for the case where said fuel cell supplies the electric power.

4. The fuel cell system according to claim 3, wherein

said calculating means calculates the amount of the primary energy consumed to supply the electric power from said fuel cell, the amount of carbon dioxide generated by supplying the electric power from said fuel cell, or the cost necessary to supply the electric power from said fuel cell, considering an amount of a primary energy consumed to start-up said fuel cell, an amount of carbon dioxide generated at the start-up of said fuel cell, or a cost necessary to start-up said fuel cell.

5. The fuel cell system according to claim 4, wherein

said calculating means calculates the amount of the primary energy consumed to start-up said fuel cell, the amount of carbon dioxide generated at the start-up of said fuel cell, or the cost necessary to start-up said fuel cell, based on a temperature of said fuel cell.

6. The fuel cell system according to claim 3, further comprising:

a fuel generator configured to generate a fuel containing hydrogen from

a material,

wherein said calculating means calculates the amount of the primary energy consumed to supply the electric power from said fuel cell, the amount of carbon dioxide generated by supplying the electric power from said fuel cell, or the cost necessary to supply the electric power from said fuel cell, considering an amount of a primary energy consumed to start-up said fuel cell, an amount of carbon dioxide generated at the start-up of said fuel cell, or a cost necessary to start-up said fuel cell.

7. The fuel cell system according to claim 6, wherein

said calculating means calculates the amount of the primary energy consumed to start-up said fuel cell, the amount of carbon dioxide generated at the start-up of said fuel cell, or the cost necessary to start-up said fuel cell, based on a temperature of said fuel generator.

8. The fuel cell system according to claim 3, further comprising:

an input means by which the value to be calculated by said calculating means is selected from the primary energy, the carbon dioxide, or the cost.

9. The fuel cell system according to claim 3, further comprising:

a display means:

wherein a difference in the amount of primary energy, the amount of carbon dioxide or the cost is calculated using the calculated values of said calculating means, for a case where said fuel cell supplies the electric power and for a case where said power system supplies the electric power, and

said display means displays the difference.

10. The fuel cell system according to claim 3, further comprising:

a heat storage means configured to recover waste heat from said fuel cell and to store the heat; and

a heat supply means configured to supply the heat stored in said heat storage means to outside,

wherein said calculating means further calculates an amount of heat recovered by said heat storage means, and an amount of the primary energy consumed to supply the heat from an external heat supply means, an amount of carbon dioxide generated by supplying the heat from said external heat supply means, or a cost necessary to supply the heat from said external heat supply means, based on the power value data for the time period, thereby calculating an amount of primary energy, an amount of carbon dioxide or a cost for a case where said fuel cell supplies the electric power and the heat and for a case where said power system supplies the electric power and said external heat supply means supplies the heat,

and wherein values calculated by said calculating means are compared and start time of the time period is decided as the scheduled start-up time when the value calculated for the case where said power system and said external heat supply means supply the electric power and the heat, respectively, is larger than the value calculated for the case where said fuel cell supplies the electric power and the heat.

11. The fuel cell system according to claim 1, wherein the scheduled

start-up time is updated for each predetermined update time.

12. The fuel cell system according to claim 1, further comprising:
a display means configured to display the scheduled start-up time.
13. The fuel cell system according to claim 1, wherein said display means is configured to display a history of past operation.
14. The fuel cell system according to claim 1, further comprising:
a heat storage means configured to recover waste heat from said fuel cell and to store the heat;
a heat supply means configured to supply the heat stored in said heat storage means to outside; and
a stored heat amount detecting means configured to detect an amount of the heat stored in said heat storage means,
wherein the load value is a calorie value of a heat load of the equipment supplied with the heat from said fuel cell system, and the load value data is calorie value data.
15. The fuel cell system according to claim 14, further comprising:
a calculating means configured to calculate an amount of primary energy consumed to supply the heat and the electric power, an amount of carbon dioxide generated by supplying the heat and the electric power, or a cost necessary to supply the heat and the electric power,
wherein said calculating means calculates the amount of primary

energy, the amount of carbon dioxide or the cost based on the calorie value data for a predetermined time period for a case where said fuel cell supplies the electric power and the heat and for a case where said power system and said external heat supply means supply the electric power and the heat, respectively,

and wherein values calculated by said calculating means are compared and start time of the time period is decided as the scheduled start-up time when the value calculated for the case where said power system and said external heat supply means supply the electric power and the heat, respectively, is larger than the value calculated for the case where said fuel cell supplies the heat and the electric power.

16. The fuel cell system according to claim 15, wherein

said calculating means calculates the amount of the primary energy consumed to supply the electric power and the heat from said fuel cell, the amount of carbon dioxide generated by supplying the electric power and the heat from said fuel cell, or the cost necessary to supply the electric power and the heat from said fuel cell, considering an amount of the primary energy consumed to start-up said fuel cell, an amount of carbon dioxide generated at the start-up of said fuel cell, or a cost necessary to start-up said fuel cell.

17. The fuel cell system according to claim 16, wherein

said calculating means calculates the amount of the primary energy consumed to start-up said fuel cell, the amount of carbon dioxide generated at start-up of said fuel cell, or the cost necessary to start-up said fuel cell, based

on a temperature of said fuel cell.

18. The fuel cell system according to claim 15, further comprising:

a fuel generator configured to generate a fuel containing hydrogen from a material,

wherein said calculating means calculates the amount of the primary energy consumed to supply the electric power and the heat from said fuel cell, the amount of carbon dioxide generated by supplying the electric power and the heat from said fuel cell, or the cost necessary to supply the electric power and the heat from said fuel cell, considering an amount of the primary energy consumed to start-up said fuel cell, an amount of carbon dioxide generated at the start-up of said fuel cell, or a cost necessary to start-up said fuel cell.

19. The fuel cell system according to claim 18, wherein

said calculating means calculates the amount of the primary energy consumed to start-up said fuel cell, the amount of carbon dioxide generated at the start-up of said fuel cell, or the cost necessary to start-up said fuel cell, based on a temperature of said fuel generator.

20. The fuel cell system according to claim 15, further comprising:

an input means by which the value to be calculated by said calculating means is selected from the primary energy, the carbon dioxide, or the cost.

21. The fuel cell system according to claim 15, further comprising:

a display means:

wherein a difference in the amount of primary energy, the amount of carbon dioxide or the cost is calculated using the calculated values of the calculating means, for the case where said fuel cell supplies the electric power and the heat and for the case where said power system and said external heat supply means supply the electric power and the heat, respectively, and said display means displays the difference.

22. The fuel cell system according to claim 1, further comprising:

a heat storage means configured to recover waste heat from said fuel cell and to store the heat;

a heat supply means configured to supply the heat stored in said heat storage means to outside;

a stored heat amount detecting means configured to detect an amount of the heat stored in said heat storage means; and

a selecting means configured to select the load value from a calorie value of a heat load of the equipment supplied with the heat from said fuel cell system or a power value of a power load of the equipment supplied with the electric power from said fuel cell system, and to thereby select power value data or calorie value data as the load value data.

23. The fuel cell system according to claim 22, wherein

said load value storage means stores the load value such that the load value in a case where a user is at home and the load value in a case where the user is away from home are distinguished from each other,

and wherein said selecting means selects determination of the

scheduled start-up time of said fuel cell from determination based on the power value data in the case where the user is at home, determination based on the power value data in the case where the user is away from home, determination based on the calorie value data in the case where the user is at home, and determination based on the calorie value data in the case where the user is away from home.

24. The fuel cell system according to claim 1, further comprising:
an operation time setting means capable of, as desired, setting the scheduled start-up time of said fuel cell.